

The conceptual design of interferometer/polarimeter system on HL-2M

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ABSTRACT

HL-2M is a new medium-sized tokamak with major radius of 1.78 m, minor radius of 0.65 m, and aspect ratio of 2.8 and will be finished soon. In the conceptual design, a double-pass, horizontal view, multi-channel far-infrared (FIR) laser interferometer/polarimeter system (at 432 μm) is proposed to simultaneously measure the phase change and the Faraday rotation for density and current profile reconstruction. A vertical CO₂ dispersion interferometer system (with wavelength of 10.6 μm and 5.3 μm) is designed to measure the line density, which will mainly be used for density feedback. The performance of the system is expected to meet the requirement of the measurements on HL-2M, with phase accuracy $\sim 0.1^\circ$, time resolution $\sim 1 \mu\text{s}$, spatial resolution $\sim 7.2 \text{ cm}$, and density measurement range of $1 \times 10^{18} - 1 \times 10^{21} \text{ m}^{-3}$.